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SETTING UP FARM RECORDS TO PROVIDE FOR ANALYSIS

Since farming is now a specialized business with large capital investments, analyzing records is more important than ever before. In this subject matter unit we will attempt to show the value of adequate records and how to set them up to provide for analysis measures.

Most of the illustrations can be used along with the Illinois Farm Record Book, made available from the College of Agriculture, University of Illinois. A problem for use with the book is available from Vocational Agriculture Service and includes analysis measures, as well as material needed for making income and social security tax reports. The present unit will be concerned with analysis measures, rather than items needed only for tax reporting.

1. WHAT DO RECORDS TELL ABOUT A FARM?

This section will illustrate briefly what records can tell about a farm business. Fig. 1 shows 7 measures obtained from a 240-acre hog farm in a recent year. The measures were made possible by accurate and thorough record keeping.

Fig. 1 shows which items have a high rating on this farm and which have a medium or low rating. Production and income items were plotted upward from the center line of the chart if their values were higher than average. Expense items were plotted downward from center if the costs were higher than average so that a high cost item will have a low rating and a low cost item a high rating.

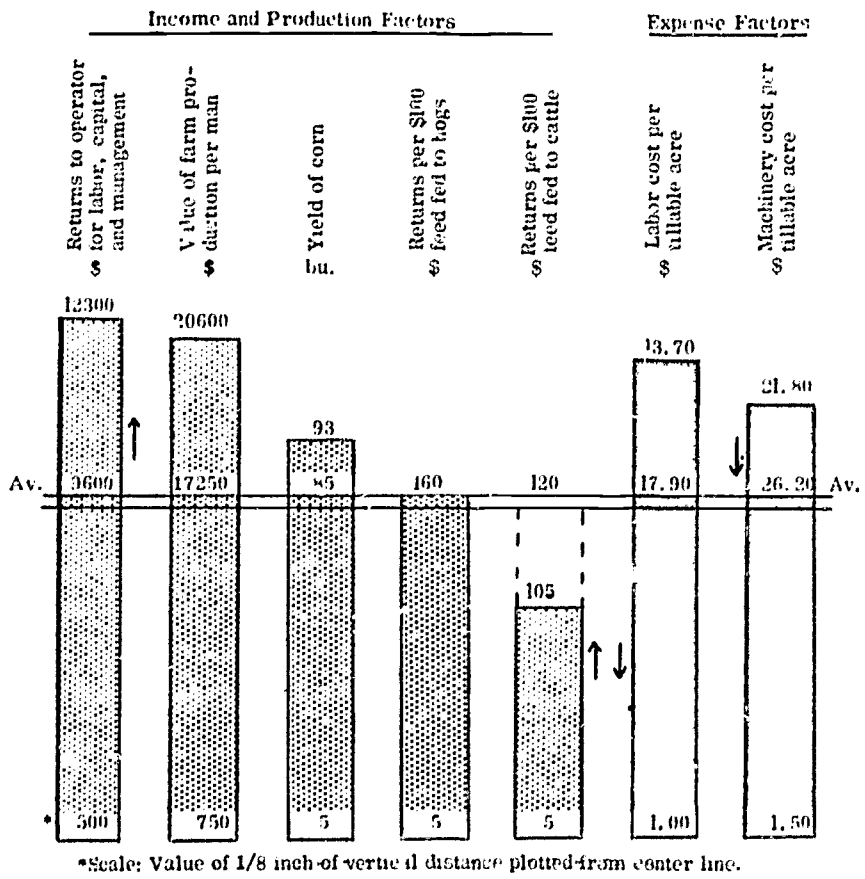
This farm rates considerably above average in returns to operator's labor, capital, and management and in value of farm production per man. Corn yields are somewhat above average. Returns per $100 feed fed are average for hogs but below average for cattle. Labor and machinery costs per tillable acre are low; thus these items have a high rating.

These results give examples of strong and weak points of a farm's operations. With adequate records many other measures can be obtained; you need not consider all of them at this time.

Finding the strong and weak points is a major step toward bringing about improvement of any business. Knowing where the farm stands in relation to other farms does not give the details of exactly what to do to bring about improvement. However, a person thoroughly familiar with the farm's operation will usually have a good idea of the changes likely needed for improvement if he can tell just where the weak points exist.

The results in Fig. 1 indicate that this farmer should carefully study his cattle feeding operations and try to improve them. If he cannot bring about improvement in the next few years, he should probably put his feed and labor in another enterprise; at least he should consider alternatives to find whether they will increase his returns.

Several items may be responsible for the low rating for the cattle feeding operation.



*Scale: Value of 1/8 inch of vertical distance plotted from center line.

Fig. 1. Comparison of results on a 240-acre hog farm with those on similar farms.

With only the preceding information at hand, each of the following may be responsible: low feeding efficiency, high death losses, or purchase and sales prices out of line.

This farmer should also consider what he can do to bring returns per $100 feed fed to hogs to a higher level. Perhaps he can increase his corn yield still more, even though that measure is above average at the present time. He has done a good job of keeping labor and machinery costs low. He will want to preserve his high rating for these items; however, additional expenses may be justified if they increase his income more than the added cost and if such an investment represents the best use of his available funds.

Record analysis thus makes it possible for a farmer to improve his business. Further study and budgeting will be necessary in order to get the full benefits. The analysis is made possible by keeping records carefully throughout the year after first setting up the record system properly. The next section will be concerned with classifying measures into major groups and the rest of the unit with setting up the record system to get such measures.

2. WHAT KINDS OF ANALYSIS MEASURES ARE NEEDED?

Section 1 showed some measures of comparison that can be obtained from complete and well-kept records. The record system must be set up properly if it is to provide the information that makes it possible to secure such measures. This section will classify the analysis measures into groups, give examples for each group, and tell why certain records need to be kept in order to obtain the measures. The kinds of measures discussed are: efficiency of crop and livestock production, costs per tillable acre, volume of business, and farm earnings.

Efficiency of crop production

The most commonly used measure of efficiency of crop production is yield per acre. This is a simple measure and does not require complicated records. However, you do need to know the total production and total number of acres of each crop. Production records are very important in this regard. Sometimes an inventory at the end of the year will help substantiate your estimate of production.

Efficiency of livestock production

Returns per $100 feed fed is a very valuable measure of efficiency with livestock. To get this measure, you need to know two things: returns from each livestock enterprise and the value of feed fed to each kind of livestock. To find the livestock returns, you need to know the values of the beginning and ending inventories, as well as purchases, sales, and products consumed in the household. In order to find the value of feed fed to each kind of livestock, you will need to have some method of recording feed fed to hogs separately from feed fed to cattle, and so on.

Another measure is feed fed per 100 pounds of gain. To get this measure, you will need to know approximately the pounds of each feed fed to each kind of livestock and the total weight or other amount of livestock and livestock products produced during the year. To find the production for the year, you will need the approximate weights of animals in the beginning and ending inventories, of animals purchased and sold (and died), and the amounts of products used in the household.

Costs per tillable acre

An example of a cost item that can readily be calculated if adequate records are kept is machinery cost per tillable acre. Total machinery cost, as reflected in this measure, consists of: annual depreciation, repairs, gas and oil, machine hire, farm share of auto depreciation and operating expenses, and the farm share of electricity and telephone. A farmer also needs to know these amounts to make the proper deductions when he reports his income tax.

Labor cost per tillable acre is a measure which includes some costs that are not tax deductible. Besides including hired labor, a tax-deductible item, this measure also reflects the value of the operator's labor and unpaid family labor used in the farm business.

Volume of business

For a large livestock operation, you should know the hundred weight of pork or beef produced. To do so, you must keep careful account of the weight of livestock bought or sold. An accurate estimate of weights of animals in beginning and ending inventories is also needed. Whenever possible, enter the amounts of physical quantities, such as weight of livestock or bushels of grain, in your record book along with the dollar values.

Value of farm production per man can be found if you know total cash receipts and expenses, purchased livestock and feed, changes in inventories, value of products consumed, and the total months of labor.

Sometimes it is helpful to know the total value of land, labor, and capital going into the business annually. Besides cash operating expenses and depreciation, you also need the values of capital items, inventory items, and unpaid labor in making this calculation.

Farm earnings

You can get an idea of farm earnings from the net farm income figure of your completed income tax report. However, such a figure is not always the best measure of earnings to use when comparing your farm with averages for other farms.

When income tax is reported by the use of the cash method, net farm income may be higher during one year merely because a higher proportion of the corn and soybean crops has been sold and ending inventories are lower than usual. Net farm income may not be a good indication of how well the total farm business is managed because of such differences as ownership, rental rates, and interest payments on borrowed money.

A farmer usually earns money from three sources: his labor, his management, and his capital investment. The returns from his capital investment include returns from land if the farmer owns a part of his land.

In analyzing records we get such measures as management returns, labor and management earnings, and capital and management earnings. If we divide the latter item by the total farm investment, we can also find the rate earned on investment. In order to get these measures, we need to place a value on inventory and capital items and unpaid labor.

3. INVENTORIES AND DEPRECIATION SCHEDULES

In Section 1 we mentioned that inventories and depreciation schedules are necessary to find measures of livestock efficiency, costs per tillable acre, volume of business, and farm earnings.

Using inventories in analysis

A complete inventory account includes 4 parts: beginning inventory, purchases, sales, and ending inventory. Table 1 shows an arrangement of these parts that will be a help later when the records are analyzed; keeping this arrangement in mind while entering records will simplify the job at the end of the year.

The Illinois Farm Record Book does not provide for recording items in such an arrangement. Beginning and ending inventories are recorded in Part II of the book; purchases and sales are recorded in Part I. By reading carefully the column headings in the record book, you can find where to record these items.

When the records are summarized and analyzed, livestock product sales and the value of products used in the household should be added to the sales of livestock. Wool is recorded along with the sale of sheep; sales

Table 1. Inventory Accounts

Item	Beginning inventory	Purchases	Sales	Ending inventory
Feed, grain, & seeds				
Beef cattle				
Dairy cattle				
Hogs				
Poultry				
Sheep				

of eggs and dairy products are recorded on separate pages. Sales of livestock products are usually considered to be in cash accounts but need to be combined with sales of inventory items for analysis purposes. The value of home-raised products used in the household is recorded on a separate page near the end of Part I.

The actual taking of inventories at the beginning and end of the year is included in VAS 2008a, Record Keeping on the Farm. The beginning inventories should be taken promptly at the start of the year before any financial transactions are recorded. The beginning-of-year values will, of course, be the same as the end-of-year values for the preceding year.

Using depreciation schedules in analysis

Depreciation schedules are kept in connection with capital accounts. A complete capital account includes parts which in general correspond to those of the inventory accounts: remaining cost at beginning of year, depreciation, remaining cost at end of year, purchases, and sales. Depreciation is a bookkeeping method of spreading the cost of a capital item over its useful life. For items on hand at the beginning and end of the year, it corresponds to the differences between the remaining cost at the beginning and end of year. Table 2 shows the various parts of the capital accounts, including depreciation.

Filling in depreciation schedules is discussed in VAS 2008a, Record Keeping on the Farm. As was true for inventories, the beginning-of-year values should be entered before any of the financial transactions. Here again, the beginning-of-year values are the same as the end-of-year values for the preceding year.

For capital accounts, the beginning and end-of-year remaining costs and the annual depreciation are recorded in Part II of the Illinois Farm Record Book; purchases and sales are recorded in Part I.

Table 2. Capital Accounts, Including Depreciation

Item	Remaining cost beginning of year	Depreciation	Remaining cost end of year	Purchases	Sales
Machinery and equipment					
Auto (farm share)					
Soil improvements					
Farm improvements					

RECORDS OF FINANCIAL TRANSACTIONS

A major portion of record keeping consists of recording the financial transactions as they occur throughout the year. The main job to be done at the time of setting up the records is to study the record book so you will know where to make the entries.

Points to remember

Physical quantities, as well as the dollar values, should be entered whenever possible. Always enter number, bushels, pounds, or tons whenever these items are known.

For the purpose of record analysis, all sales made during the year should be included for that year even though payment is not received until a later date. All farm expenses incurred should be included, regardless of whether or not payment has been made by the end of the year. Of course, if you report income tax on the cash basis, you will need to indicate in your record book the expense items not paid by the end of the year and the receipt items for which payment has not been received.

Always enter as sales the value of farm products traded for merchandise. Enter in the record book the full price of capital items purchased on time.

Receipts and expenses

Most receipt items are entered in the separate section for receipts in Part I of the Illinois Farm Record Book. Check the book carefully to find which columns to use.

Notice the instructions given for entering sales of purchased feeder livestock. The column you use will probably depend on whether you use the cash or accrual method of reporting income tax. Sales of breeding or dairy stock are entered in a special column under either method. Differences in entries for the sale of livestock are due chiefly to tax considerations; if the record were used only for analysis purposes, all sales of beef could be entered in a "beef sales" column, all sales of hogs in a "hog sales" column, and so on.

Most cash expenses are entered in the expense section in Part I. However, cash wages paid to hired labor, social security tax withheld from wages, products furnished to workers, and insurance on workers are recorded in a "hired labor" section. Each of these items is a part of the total cost of hired labor.

Most receipt and expense items are entered in two columns; one is a column for entering totals and the other is a classifying column. It is important to make entries in each of these two spaces as an aid in cross-checking totals at the end of the year.

5. FEED RECORDS

Some measures of feed efficiency were discussed in Section 1. These measures depend on a reasonably accurate record of feed fed to each kind of livestock. If you take inventories and estimate grain production accurately, the job of getting suitable feed records will be simplified. If you have more than one kind of livestock, you should work out a system that provides records of feed fed to each kind.

Getting accurate feed records

An accurate estimate of the bushels of corn and oats produced and amounts in beginning and ending inventories is very helpful as a check on the amount of feed fed. A simple method of determining the bushels of small grains or shelled corn on hand is to find the number of cubic feet and divide by 1 1/4 cubic feet per bushel. To find the bushels of ear corn, divide the cubic feet by 2 1/2.

The tons of roughage on hand can also be estimated by first determining the volume. For baled hay, find the number of cubic feet and divide by 150 or 200 cubic feet per ton, depending on the tightness of baling and stacking. For example, hay tightly baled and stacked covers an area 16 feet long and 10 feet wide. The bales are stacked 5 feet high. The total volume is 800 cubic feet (16 x 10 x 5). The number of tons is 5.3 (800 ÷ 150).

The tons of tractor-packed silage in a trench or bunker silo can be estimated by dividing the volume in cubic feet by 57 cubic feet per ton for corn silage, or 50 for grass silage. Since the width at the top may be greater than at the bottom, you will want to use the average width in finding the number of cubic feet.

Various tables give the capacities of round silos. A portion of such a table that assumes average contents of moisture and grain and a settling period of a month or more is shown in the following:

Depth of silage in feet	Inside diameter in feet 14 (tons)	16 (tons)	18 (tons)	20 (tons)
10	27	35	44	55
14	39	51	64	80
18	51	67	85	105
22	64	84	106	130
26	77	100	127	157
30	90	118	149	184

Silage at the bottom of a silo is more densely packed than at the top. You can estimate the tons removed by subtracting the tonnage corresponding to the depth at the end of the year from that before any silage was fed. Example: An upright silo 16 feet in diameter held silage to a depth of 30 feet before feeding began. At the end of the year the silage was 14 feet deep. How much remained in inventory and how much was fed? The estimated weight of silage 30 feet deep is 118 tons; that of silage 14 feet deep in a silo that is 16 feet in diameter is 51 tons: The amount in the ending inventory (or beginning inventory for the next year) is therefore 51 tons; the amount fed was 67 tons.

Purchased feed should be accurately entered in the record book at the time of purchase. Be sure to include the volume in pounds, bushels, or tons along with the price. Also list the kind of livestock that will consume the feed if known, particularly for protein supplement.

You can get a rough estimate, or at least make a check, of each feed fed during the year by the following method: First add the amounts for ending inventory, the year's production, and sales. Then subtract the amounts for beginning inventory and purchases. The resulting figure should be the amount fed, adjusted for any shrinkage or overrun. That estimate of feed fed can be checked against periodic records you keep of amounts fed. Your accuracy in keeping records of beginning and ending inventories and production will therefore be very important in determining the usefulness of your records toward providing figures from which you can get measures of feeding efficiency.

Feed allocation records

If only one kind of livestock is fed, the job of keeping feed records is fairly simple. When more than one kind of livestock is fed, you will need to know the amounts of feed fed to each kind.

Table 3 can be a help for periodically recording the feed fed to the various classes of livestock. You will need one form similar to Table 3 for each kind of livestock fed.

You will need to record periodically the feed fed to each kind of livestock. It is suggested that the recording be done each month; however, variations are permissible as long as all the feed is accurately recorded.

Where facilities permit weighing the feed, that practice will, of course, provide for greatest accuracy. In the absence of such facilities, the estimate should be made by the use of the best alternative. Alternative methods might be feeding from separate bins or estimating the amount for cattle on the basis of pounds fed per nead per day. Checks should be made against inventories, production, and purchases as suggested in the first portion of this section.

The amounts of commercial feeds purchased can be obtained directly from the financial entry in the expense section of the record book. The same may also be true for other feeds purchased. Use the actual price paid for commercial feed; an average price for grains (both raised and purchased) will provide simplification.

The number of pasture days can be estimated by several methods. One method is to multiply the carrying capacity per acre of pasture (example: 175 pasture days per acre of alfalfa) times the number of acres consumed by the livestock. This method is commonly used for estimating the pasture days for hogs. Another method is to multiply the number of animal units by the calendar days on pasture. An animal unit equals 1 cow or mature bull, 1 1/2 yearling cattle, 1000 pounds of feeder cattle, 2 weaned calves, 15 pigs, 5 mature sheep, or 10 weaned lambs.

Pasture value can also be figured on the basis of cash rental value or value as hay minus harvesting cost; however, the number of pasture days is not provided directly by the latter methods.

Table 3. Feed Record for _____ (Kind of Livestock); Year _____

Month	Corn (bu.)	Oats (bu.)	_____	Hay (tons)	Silage (tons)	Pasture days	Commercial feed (lb.)
January							
February							
March							
April							
May							
June							
July							
August							
September							
October							
November							
December							
Total							
Price per unit							
Total value							

6. RECORDS OF PRODUCTION AND MISCELLANEOUS ITEMS

Production records are very useful in record analysis. They are important from the standpoint of studying the efficiency of the entire farm business, as well as efficiency of crop and livestock production.

Crop production

The Illinois Farm Record Book provides a page for recording acreage, yield, and total production of each crop. Familiarize yourself with this portion of the book so you will know where to record these items as they become known during the year.

After each crop is planted, you will want to record the acreage planted. A farm map can be helpful in this respect. If the acreage harvested differs from the acreage planted, be sure to record these differences. As soon as bushels or tons harvested are known, record these items in the record book.

The tenant's share of crop acres, expressed as a percentage of total crop acres, may roughly reflect his share of the total value of production. Fig. 4 shows a situation where a tenant receives 50 percent of the corn crop and 60 percent of the soybean and wheat crops. In terms of acres, his share of production is 54.3 percent.

The value of production for the tenant's share as shown in his records, for example, is $12,000. Dividing the value of production by 54.3 percent gives a figure of $22,100. The latter figure is a rough estimate of the value of production for the entire farm.

Determining your share of crop acres when the records are set up, or when the crops are planted, will simplify the job of finding the total value of production for the farm at the end of the year.

Livestock production

Only a limited amount of space is provided in the Illinois Farm Record Book for production records for livestock.

Some farmers keep special detailed records of production as members of livestock improvement associations, such as for dairy

Table 4. Crop Acreage and Summary of Operator's Share

Crop	Acres owned	Acres cash rented	Acres share rented				Total	Operator's share
			50-50		Other			
			Total	Share	Total	Share		
Corn	--	--	160	80			160	80
Soybeans	--	--			80	48	80	48
Wheat	--	--			40	24	40	24
Total tillable acres	--	--	160	80	120	72	280	152
Tenant's share (%)								54.3%

or swine enterprises. These records generally include such items as total production on an individual animal basis, weights at various ages, rate of gain, breeding records, and loss records. These records can be very valuable for longtime improvement of the breeding herd. Farmers who do not belong to livestock improvement associations also need records of some of these items as an aid in analysis at the end of the year.

Various methods of keeping production and loss records have been devised. Usually the very minimum consists of breeding records and number of animals born, weaned, and died. Table 5 provides a method of keeping simple production records and Table 6 serves as a means for recording losses of livestock. Records of the amounts of eggs and milk sold should be kept in addition to the dollar value of such sales. When livestock products used in the household are added to amounts sold, the total production of livestock products can be estimated.

Table 5. Breeding, Birth, and Weaning Record

Sire	Dam	Date		Birth Record		Weaned		REMARKS Identification marks, sex of animals, etc.
		Bred	Due	Date	No.	Date	No.	
TOTALS		xxxx	xxxx	xxxx		xxxx		

Table 6. Death Loss Record 1/

Date	No.	Weight	Cause of Death	Date	No.	Weight	Cause of Death
				TOTALS			

1/ Do not include pig losses before weaning.